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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,684	11/08/2002	Jean-Pierre Delhomme	21.0910	2320

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EXAMINER	
SHARON, AYAL I	

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 08/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/065,684	DELHOMME ET AL.	
	Examiner	Art Unit	
	Ayal I. Sharon	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *6/2/06* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1-2 and 4-15 of U.S. Application 10/065,684, originally filed on 11/08/2002, have been presented for examination. The application claims foreign priority to French application 0114447, filed on 11/08/2001.
2. New rejections have been applied. This action is non-final.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. **Claims 1-2 and 4-15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.**
5. The fundamental test for patent eligibility is to determine whether the claimed invention produces a "**useful, concrete and tangible result.**" See State Street Bank & Trust Co. v. Signature Financial Group Inc., 149 F. 3d 1368, 47 USPQ2d 1596 (Fed. Cir. 1998) and AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352, 50 USPQ2d 1447 (Fed. Cir. 1999). In these decisions, the court found that the claimed invention as a whole must accomplish a practical application. That is, it must produce a "useful, concrete and tangible result."

6. See State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. ("[T]he transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces 'a useful, concrete and tangible result' – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades").
7. See also AT&T, 172 F.3d at 1358, 50 USPQ2d at 1452 (Claims drawn to a long-distance telephone billing process containing mathematical algorithms were held patentable subject matter because the process used the algorithm to produce a useful, concrete, tangible result - a primary inter-exchange carrier ("PIC") indicator - without preempting other uses of the mathematical principle).
8. The Examiner respectfully submits the claimed invention does not recite a concrete, useful, tangible result.
9. Independent claims 1 and 15 do not create a concrete, useful, tangible result if the SSD and SDM substantially coincide.
10. Independent claim 14 does not create a concrete, useful, tangible result if the SRD and RDM substantially coincide.
11. The preamble of independent claim 15 recites "A process for determining ... a dynamic flow model", yet none of the limitations expressly produce this result. Instead, the limitations produce a simulated saturation distribution, and a measured saturation distribution.

12. Moreover, claims 1, 14, and 15 all repeat steps (b) and (c) if the distributions do not "substantially coincide". The claims do not indicate what happens if after steps (b) and (c), the distributions still do not "substantially coincide".

13. Moreover, claims 1, 14 and 15 do not indicate how if steps (b) and (c) are repeated once or several times (in a loop). If there is a loop, there is no indication when the loop stops.

14. Moreover, claims 1, 14 and 15 do not indicate if steps (d) and/or (e) are also repeated.

15. Moreover, the claims do not indicate what is the tangible result, especially if (b) and (c) are repeated only once, without repeating step (d).

16. Therefore, claims 1, 14, and 15 do not create a "concrete, tangible" result.

17. Claim 15, which merely "determin[es] ... a dynamic flow model", does not create a concrete, useful, tangible result. It only creates an abstraction.

18. Claims 1 and 14 do not indicate what is the utility of determining "the variation in the relative permeability ... of at least one of the fluids in the reservoir."

Claim Rejections - 35 USC § 112

19. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

20. Claims 1-2 and 4-14 rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The preamble of independent claims

1 and 14 recite "A process for determining ... the variation in the relative permeability ... of at least one of the fluids in the reservoir, as a function of the saturation", yet none of the limitations expressly produce this result. Instead, the limitations produce a simulated saturation distribution, and a measured saturation distribution, without deriving the "variation in the relative permeability." The omitted steps are: the steps for deriving the "variation in the relative permeability."

Allowable Subject Matter

21. The following is a statement of reasons for the indication of allowable subject matter for claims 1-2 and 4-15.

22. The following are the prior art references referred to in this indication of allowable subject matter:

    a) U.S. Patent 5,335,542 to Ramakrishnan et al. ("**Ramakrishnan**").

    b) U.S. Patent 5,663,499 to Semmelbeck et al. ("**Semmelbeck**").

    c) Cope. G. "Improving Efficiency Through Reservoir Modelling and Production Simulation." Journal of Canadian Petroleum Technology. Apr. 2001. Vol.40, No.4. pp.7-11. ("**Cope**").

    d) U.S. PG-PUB 2002/0013687 to Ortoleva. ("**Ortoleva**").

23. Independent Claim 1 of the application is as follows:

> *1. A process for determining, for a reservoir containing fluids (W, O), the variation in the relative permeability (krO, krW) of at least one of the fluids in the reservoir, as a function of the saturation of at least one of the fluid (W, O), the method comprising:*

(a) determining, for one of the fluids of the reservoir, a saturation distribution on the basis of a measurement (SDM) of a physical property in the reservoir;

(b) creating a dynamic model for the flow of fluids in the reservoir;

(c) generating a simulated saturation distribution (SSD) by the dynamic model;

(d) comparing the SSD with the SDM; and

(e) if SSD and SDM do not substantially coincide, updating the dynamic model with intermediate relative permeability values $(kr0)_i$ *, and* $(krW)_i$ *and repeating steps (b) and (c).*

24. The Ramakrishnan reference teaches the use of a fluid mechanical model (see Fig.8c, Item 313) to calculate flow rates of oil and water (see Fig.8c, Item 315), and compare the calculated values to the measured values (See Fig.8c, Items 311 and 319). Ramakrishnan then checks to see if the values are converging (See Fig.8c, Item 327). If not, new initial values are input into the fluid mechanical model (see Fig.8c, Item 329). These new values include new "x list" values such as a "permeability tensor B." (See Col.14, lines 62-66; and Fig.8c, Items 307 and 329).

Ramakrishnan also teaches that an object of its invention is to provide a "fluid sampling / injection borehole tool where the pressure, flow, and permeability information is used in conjunction with the electromagnetic information to provide a three dimensional saturation / conductivity map or image of the formation." (See Col.3, lines 23-30).

Ramakrishnan also teaches that "Relative permeabilities are hysteretic functions of saturations and ... can be described in terms of a few parameters such as connate water saturation ... residual water saturation ... maximum residual oil saturation ... and pore size distribution index ..." (See Col.12, line 63 to col.13, line 5).

Ramakrishnan also teaches the use of a "known" parameter values ("the y-list"), which include "the Archie exponents m and n." (See Col.14, lines 45-57; and Fig.8c, Item 305).

However, the Ramakrishnan reference compares calculated flow rates and currents to measured flow rates and currents (See Fig.8c, Items 311 and 319), not the calculated and measured saturation distributions, as claimed in limitation (d).

Moreovoer, Ramakrishnan does not expressly teach the use of "intermediate relative permeability values" as claimed in limitation (e) of claim 1.

25. The Semmelbeck reference teaches measuring ("logging") a wide variety of drilling parameter data, including porosity, water saturation, water resistivity, cementation factor, formation temperature, cementation exponent, saturation exponent, shale volume, shale resistivity, capillary entrance pressure, etc. (See col.2, lines 34-41).

Semmelbeck also teaches that "[t]he water saturation equation that is used in the petrophysical evaluation, such as Archie, Simandoux, or dual-water,

must also be used in permeability analysis algorithms to ensure a consistent analysis." (See col.2, lines 42-45).

Semmelbeck also teaches that "a radial resistivity distribution around the bore hole at the time of logging is calculated. ... These calculated logs are then compared to the measured logs." (See col.2, lines 52-62). Then, the input parameters are varied "until the best possible statistical match of the measured log data and the calculated log data is obtained. The permeability ... is thus estimated." (See col.2, line 63 to col.3, line 3).

Semmelbeck also teaches the use of the "Darcy Flow Equation" to model the "flowing phase in a reservoir." (See col.5, lines 18-25).

However, the Semmelbeck reference compares calculated and measured permeability (See col.2, line 63 to col.3, line 3), not calculated and measured saturation distributions, as claimed in limitation (d).

Moreovoer, Semmelbeck does not expressly teach the use of "intermediate relative permeability values" as claimed in limitation (e) of claim 1.

26. Dependent claims 2 and 4-13 depend from independent claim 1.

27. Independent Claim 14 of the application is as follows:

> *14. A process for determining, for a reservoir containing fluids (W, O), the variation in the relative permeability (krO, krW) of at least one of the fluids in the reservoir, as a function of the saturation of at least one of the fluid (W, O), the method comprising:*
>
> *(a) determining, for one of the fluids of the reservoir, a saturation distribution on the basis of a measurement (RDM) of a physical property in the reservoir;*
>
> *(b) creating a dynamic model for the flow of fluids in the reservoir;*

(c) generating a simulated resistivity distribution (SRD) by the dynamic model;

(d) comparing the SRD with the RDM; and

(e) if SSD and SDM do not substantially coincide, updating the dynamic model with intermediate relative permeability values $(kr0)_i$, and $(krW)_i$ and repeating steps (b) and (c).

28. Independent claim 14 contains allowable subject matter because none of the cited references expressly teach limitation (d).

The Ramakrishnan reference compares calculated flow rates and currents to measured flow rates and currents (See Fig.8c, Items 311 and 319), not the calculated and measured resistivity distributions, as claimed in limitation (d).

The Semmelbeck reference compares calculated and measured permeability (See col.2, line 63 to col.3, line 3), not calculated and measured resistivity distributions, as claimed in limitation (d).

In regards to the Ortoleva reference, that was presented in the previous Office Action, paragraph [0207] of Ortoleva expressly teaches formulas that relate parameters, including resistivity, to texture and fluid properties. Paragraph [0207] also teaches that the formulas can be used in the optimization algorithm of Fig.21. This reads on limitations (a), (b), (c), and (d).

The Ortoleva reference, however, does not expressly teach the use of "intermediate relative permeability values" as claimed in limitation (e) of claim 14, to be used in combination with limitations (b) and (c).

The Cope reference also does not teach the use of the "intermediate relative permeability values".

29. Independent Claim 15 of the application is as follows:

> *15. A process for determining, for a reservoir containing fluids (W, O), the variation in the relative permeability (krO, krW) of at least one of the fluids in the reservoir, as a function of the saturation of at least one of the fluid (W, O), the method comprising:*
>
> *(a) determining, for one of the fluids of the reservoir, a saturation distribution on the basis of a measurement (SDM) of a physical property in the reservoir;*
>
> *(b) creating a dynamic model for the flow of fluids in the reservoir on the basis of the variation in the relative permeability (krO, krW) of at least one of the fluids in the reservoir, as a function of the saturation of at least one of the fluid (W, O) obtained from a measurement of a core from the reservoir;;*
>
> *(c) generating a simulated saturation distribution (SSD) by the dynamic model;*
>
> *(d) comparing the SSD with the SDM; and*
>
> *(e) if SSD and SDM do not substantially coincide, updating the dynamic model with intermediate relative permeability values $(kr0)_i$, and $(krW)_i$ and repeating steps (b) and (c).*

30. Independent claim 15 contains allowable subject matter for the same reasons as independent claim 1.

Response to Amendment

Re: Drawings

31. Applicant's replacement drawings filed on 6/2/2006 overcome the objections. The objections have been withdrawn.

Re: Claim Rejections - 35 USC § 103

32. In regards to the 35 U.S.C. § 103 rejections presented in the previous Office Action, Examiner finds that Applicant's arguments (filed on 6/2/2006), regarding the Ortoleva reference, are persuasive. Those rejections have been withdrawn.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a bi-week, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753.

Any response to this office action should be faxed to (571) 273-8300, or mailed to:

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or hand carried to:

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon
Art Unit 2123
August 16, 2006

8/18/06

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